AMENDMENTS TO THE CLAIMS

The listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) ~~A lasing semiconductor optical amplifier (SOA)~~ An apparatus for amplifying an optical signal, comprising:

a vertical cavity lasing SOA for amplifying an optical signal traveling through an active region of the lasing SOA and outputting an amplified optical signal, wherein a ballast laser signal produced by the vertical cavity lasing SOA ~~that~~ acts as a ballast with respect to the amplification of the optical signal;

a detector coupled to a surface of the lasing SOA that emits the ballast laser signal ~~positioned proximate the lasing SOA~~ to convert the ballast laser signal to an electrical signal; and

a power monitor, coupled to the detector, for analyzing the electrical signal ~~and determining~~ to determine a power level of the ballast laser signal ~~optical signal~~, wherein a pumping current of the vertical cavity lasing SOA is adjusted based on the power level of the ballast laser signal to amplify the optical signal.

2. (Currently Amended) The ~~lasing SOA~~ apparatus of claim 1, wherein the vertical cavity lasing SOA further comprises:

an input for receiving the optical signal;

a laser cavity coupled to the input, the laser cavity adapted to amplify the optical signal and output the ballast laser signal; and

an output coupled to the laser cavity, the output adapted to transmit the amplified optical signal from the lasing SOA.

3. (Currently Amended) The ~~lasing SOA~~ apparatus of claim 2, wherein the laser cavity comprises:

a top mirror;

a bottom mirror;

an active region positioned between the top mirror and the bottom mirror; and

a pump coupled to the active region, the pump adapted to increase a carrier density population within the active region.

4. (Currently Amended) The ~~lasing SOA~~ apparatus of claim 2 wherein the laser cavity is oriented vertically with respect to an amplification path of the optical signal.

5. (Currently Amended) The ~~lasing SOA~~ apparatus of claim 2 wherein the laser cavity is oriented horizontally with respect to an amplification path of the optical signal.

6. (Currently Amended) The ~~lasing SOA~~ apparatus of claim 2 wherein the laser cavity is oriented transversely with respect to an amplification path of the optical signal.

7. (Currently Amended) The ~~lasing SOA~~ apparatus of claim 2 wherein the detector is. positioned near the output of the lasing SOA.

8. (Currently Amended) The ~~lasing SOA~~ apparatus of claim 2 wherein the detector and the lasing SOA are integrated on the same substrate.

9. (Currently Amended) The ~~lasing SOA~~ apparatus of claim 1 wherein the detector comprises a PIN diode.

10. (Currently Amended) The ~~lasing SOA~~ apparatus of claim 1. wherein the detector comprises an avalanche photodiode.

11. (Currently Amended) The ~~lasing SOA~~ apparatus of claim 1 wherein the power monitor comprises a comparator that determines if the vertical cavity lasing SOA is approaching saturation.

12. (Currently Amended) The ~~lasing SOA~~ apparatus of claim 11 wherein the comparator comprises a Schmitt trigger.

13. ((Currently Amended)The ~~lasing SOA~~ apparatus of claim 1 further comprising a pump source, coupled to the power monitor and the lasing SOA, that pumps a gain medium within the vertical cavity lasing SOA in response to the power monitor.

14-17. (Cancelled)

18. (Currently Amended) A vertical cavity lasing SOA output power detection and control system comprising:

a plurality of vertical cavity lasing SOAs for amplifying at least one optical signal, each vertical cavity lasing SOA ~~and further for~~ outputting a ballast laser signal which acts as a ballast with respect to the amplification of the at least one optical signal in each lasing SOA;

at least one detector coupled with each lasing SOA, ~~positioned proximate to at least one lasing SOA within the plurality of lasing SOAs, to~~ each detector converting a particular ~~convert~~ ballast laser signal ~~from the at least one lasing SOA~~ to an electrical signal; and

a power monitor[[,]] coupled to the at least one detector, wherein the power monitor analyzes each electrical signal from each detector to determine ~~for analyzing the electrical signal and determining~~ a power level of each ballast laser signal, wherein a pump current of each lasing SOA is adjusted based on the power level of each corresponding ballast laser signal such that an output signal of each vertical cavity lasing SOA is amplified without saturating the vertical cavity lasing SOA. ~~the at least one optical signal~~.

19. (Currently Amended) The detection and control system of claim 18 wherein the at least one vertical cavity lasing SOA and the at least one detector are integrated on the same substrate.

20. (Original) The detection and control system of claim 18 wherein the at least one detector comprises a PIN diode.

21. (Original) The detection and control system of claim 18 wherein the at least one detector comprises an avalanche photodiode.

22. (Currently Amended) The detection and control system of claim 18 wherein the power monitor comprises at least one comparator that determines if the at least one vertical cavity lasing SOA is approaching saturation.

23. (Currently Amended) The detection and control system of claim 18 further comprising a pump source, coupled to the power monitor and the at least one vertical cavity lasing SOA, that pumps a gain medium within the vertical cavity lasing SOA in response to the power monitor.

24. (Currently Amended) A method for controlling an output power of an optical signal amplified in ~~on~~ a lasing SOA, the method comprising the steps of:

amplifying an optical signal as the optical signal travels through an active region of a lasing SOA:

outputting a ballast laser signal from the lasing SOA, wherein the ballast laser signal acts as a ballast with respect to amplification of the optical signal;

detecting the ballast laser signal with a detector coupled to the lasing SOA; ~~and~~

monitoring ~~the~~ a power of the ~~amplified optical signal by the~~ detected ballast laser signal; and

adjusting a pumping current of the lasing SOA to control amplification of the output optical signal and to prevent the lasing SOA from saturation based on the power of the detected ballast laser signal.

25. (Original) The method of claim 24 further comprising the step of controlling the output power of the lasing SOA in response to detected ballast laser signal.

26. (Currently Amended) The method of claim 25, further comprising controlling ~~wherein~~ the output power of the lasing SOA ~~is controlled by~~ with a pump source that pumps ~~an~~ the active region within the lasing SOA.

27. (Currently Amended) The method of claim 24, further comprising orienting ~~wherein the lasing SOA has~~ a laser cavity ~~that is oriented~~ of the lasing SOA vertically with respect to an amplification path of the optical signal.

28. (Currently Amended) The method of claim 24, further comprising orienting ~~wherein the lasing SOA has~~ a laser cavity of the lasing SOA ~~that is oriented~~ horizontally with respect to an amplification path of the optical signal.

29. (Currently Amended) The method of claim 24, further comprising orienting ~~wherein the lasing SOA has~~ a laser cavity ~~that is oriented~~ of the lasing SOA transversely with respect to an amplification path of the optical signal.

30. (Currently Amended) The method of claim 24, further comprising detecting ~~wherein a PIN diode detects~~ the ballast laser signal of the lasing SOA with a PIN diode.

31. (Currently Amended) The method of claim 24, further comprising detecting ~~wherein an avalanche photodiode detects~~ the ballast laser signal of the lasing SOA with an avalanche photodiode.

32. (Currently Amended) The method of claim 24, further comprising monitoring ~~wherein a comparator monitors~~ the power of the amplified optical signal with a comparator.

33. (Original) The method of claim 24 further comprising the steps of:

delaying the optical signal; and

controlling the output power of a second lasing SOA that further amplifies the optical signal in response to the detected ballast laser signal.

34. (Currently Amended) The method of claim 33, further comprising delaying ~~wherein~~ the optical signal ~~is delayed~~ using an electrical buffer.

35. (Currently Amended) The method of claim 33, further comprising delaying ~~wherein~~ the optical signal ~~is delayed~~ using an optical buffer.

36. (Currently Amended) The method of claim 33, further comprising controlling an ~~wherein~~ output power of the second lasing SOA ~~is controlled~~ by an adjustable pump source that pumps an active medium with the second lasing SOA.

37. (New) A lasing semiconductor optical amplifier (SOA) comprising:

a first lasing SOA that outputs a ballast laser signal that acts as a ballast to an optical signal being amplified by the first lasing SOA;

a detector coupled to the first lasing SOA, wherein the detector detects the ballast laser signal and converts the laser ballast signal to an electrical signal;

a power monitor than analyzes the electrical signal to determine whether the first lasing SOA is saturated or is approaching saturation; and

a pump source that adjusts an output power of a second lasing SOA in response to a signal from the power monitor, the second lasing SOA further amplifying the optical signal.

38. (New) An apparatus as defined in claim 37, further comprising a buffer that delays the optical signal between the first lasing SOA and the second lasing SOA a period of time for the power monitor to generate the signal that adjusts the output power of the second lasing SOA.

39. (New) An apparatus as defined in claim 37, further comprising an optical element that acts on the optical signal output by the first lasing SOA to prevent the optical signal from saturating the second lasing SOA, wherein the element is at least one of: a variable optical attenuator; a tunable gain vertical lasing SOA; and a tunable gain optical amplifier.

40. (New) An apparatus as defined in claim 18, wherein at least two of the plurality of lasing SOAs amplify the same optical signal.